NR&D

QUCM

Quantum Universal Communications Module

Description

Niobrara's Quantum Universal Communications Modules (QUCM-O & QUCM-OE) are programmable serial communication modules for Schneider Automation's Quantum™ PLC with two serial ports, a PLC interface, a LED array, a real-time clock, a TCP/IP stack, two application areas, and internal registers. The QUCM-OE offers an additional Ethernet port.

The QUCM comes from the factory with the Routing and Protocol Conversion (RPC) application which supports all of the important Schneider North American serial protocols: Modbus RTU or ASCII, master or slave; SY/MAX Point-to-Point or Net-to-Net; Plogic, PNIM and RNIM (master or slave); Dual Modbus & RNIM master (drop Modbus devices on RNIM radio networks); Dual Modbus & SY/MAX slave.

Uses for the QUCM

Data Concentrator
- Read data from external devices and/or the PLC
- Allow external devices and/or the PLC to write data to the QUCM
- Both the PLC and external devices can read the gathered data
- Time-stamp data for later retrieval

Protocol Converter
- Allow devices with different protocols on separate ports to communicate
- The PLC can use standard MSTRs to read/write non-Modbus devices
- Non-Modbus devices and read/write the QUCM or the PLC

Add PLC Modbus Master ports (RTU or ASCII)
- Read/write Modbus Slaves devices from the PLC or the User Application
- Use MSTRs to read 0x, 1x, 3x, 4x values
- Use MSTRs to write 0x coils and 4x holding registers

Add PLC Modbus Slave ports (RTU or ASCII)
- Read, write and program the PLC
- Read and write the QUCM

Email client
- Send and receive e-mails for alarm conditions

Web server*
- Access device data and configure setup parameters with a web page

Gateway
- Allow Ethernet clients to access PLC and serial slaves
- Allow serial master to access PLC and Ethernet servers

Applications

The engineers at Niobrara have written several applications:

Collaborative Automation Partner Program

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- Interfacing an ACCU-SORT Scanner to a Quantum PLC
- Interfacing Modbus RTU master to 3694(R) devices
- Interfacing Modbus RTU master to an Allen Bradley® DF1 device
- Interfacing Modbus RTU master to ENRON/Daniel Modbus Slaves
- Gathering data from Simpson Hawk™ meters for the Quantum PLC

The source code for these and other applications is available at www.niobrara.com. The applications can be used as is or modified to solve your PLC communication problem or used as examples to start you own QUCM application development.

QUCM Language

The QUCM is programmed via Niobrara's QUCM language. The language has a BASIC-like structure which makes it easy to read and follow. Powerful language extensions for data communications and PLC interfacing make it ideal for use as a PLC communication language. A TCP/IP stack is built in, making it easy to write application layer protocols using TCP, UDP, PPP, and IP. The language is compiled for the fastest possible execution. The compiler is included at no extra charge.

Although the QUCM is designed for user programming, many companies choose to have Niobrara write their QUCM code. Contact Niobrara for a quote.

"Each of the serial ports can be individually configured to speak one of many protocols..."

Application Areas

The QUCM can run two simultaneous applications. Both applications have access to the PLC backplane, the serial ports, the LED array, the real-time clock, the TCP/IP stack, and the internal registers. The applications can be independent or they can cooperate, using mailbox registers to exchange data.

Serial Ports

The two serial ports on the QUCM are switch selectable RS-232 or RS-485. They use Modicon's pinouts, so standard cables work well. They are independently configurable as to baud rate, parity, data bits, and stop bits. Write the protocol of your equipment to:

- Be a Master or a Slave device while multidropping up to 32 devices off of either port
- Build a Protocol Converter
- Build a Data Concentrator for serial or Ethernet devices
- Use the PLC to trigger messages to printers or signs
- Bring data into the PLC from barcode readers, scales, and other ASCII devices
- Build a gateway to allow ASCII devices onto the Ethernet network
- Dial-out to your ISP and communicate on the Internet using PPP

Several serial protocols have been implemented in various products and are available online:

- 3964R
- Caterpillar EMCP Genset
- Caterpillar 3500 Engines
- DNP 3.0
- Dupline I/O
- Allen-Bradley® DF1
- ENRON/Daniel Modbus
- Cutler-Hammer INCOM
- GE Multilin 169 Plus
- Johnson Controls N2 (Metasys®)
- Mitsubishi UPS
- Siemens SEAbus & SEAbus+

- Elliott Flow Computer
- Simpson Hawk™ meters

Ethernet Port (QUCM-OE only)

The single 10BaseT RJ45 Ethernet port defaults to Modbus/TCP protocol. The QUCM has a TCP/IP stack which the user's application can access for easy implementation of various application layer protocols. Several application layer protocols have been implemented; examples are available online.

- HTML/HTTP
- Cutler-Hammer INCOM
- Chat
- FTP
- DNS
- SNMP (Client or server)
- SMTP
- Telnet
- POP3

Backplane

The programmer has a choice of backplane interfaces. The QUCM can be either an I/O Module or an Option Adapter.

When the QUCM is configured as an option-module:

- The backplane acts as a bidirectional Modbus port giving both the Quantum processor and the QUCM access to the other's register space.
- The PLC can be programmed from the QUCM
- Using standard MSTRs, the PLC can speak new Serial Protocols.
- Requires a free slot in the main rack

As an I/O module, the QUCM can be used:

- In any slot in any Quantum rack; local, distributed or remote.
- In applications that require fewer than 32 registers in and 32 registers out.

LEDs / Time Clock

The QUCM has ten LEDs under Application control. It also has LEDs to indicate Application 1 RUN, Application 2 RUN, Port 1 transmit and receive, Port 2 transmit and receive, as well as Module Active, Ethernet Link, RX, TX, Collision, Ready, Run, and Fault.

A real-time clock is available to the applications and is especially useful for scheduling events or time-stamping data.

Miscellaneous

In applications not requiring a PLC, the QUCM can be used stand-alone with Niobrara's QXBP-001. To connect PC COM: port to the QUCM use an MM1 cable. To break-out the RJ-45 connector to screw terminals use a BB85. For optically isolated RS-485 use the DDC2I.

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Ordering Information

The QUCM is available as:

- **QUCM-O** with two switch-selectable RS-232/RS-485 ports
- **QUCM-OE** with two switch-selectable RS-232/RS-485 ports and one 10BaseT Ethernet port

Related Equipment

- **MM1** RS-232 cable for configuring the QUCM
- **BB85** Din-rail mounted RS-485 screw terminal
- **QXBP-001** Single-slot rack with built-in power supply for stand-alone applications
- **DDC2I** Optically isolated RS-232<->RS-485 converter, din-rail mount

* Schneider Automation holds a patent for serving web pages from a PLC. If the QUCM is used to serve web pages from the Quantum PLC a license is required. This license is available from NR&D at additional cost or from Schneider Automation.

Specifications

Warranty / Manual	The QUCM is furnished with a user manual on cd and carries a one year warranty from the date of shipment. During the warranty period, free firmware upgrades are available. See Niobrara's Standard Terms and Conditions of Sale for additional warranty information.
Dimensions	Standard Quantum register module. 1.59" wide by 9.84" tall by 4.09" deep (40 x 250 x104mm). Approximately 12 oz. (340 g.) net. All connectors and indicators are front mounted except the Quantum bus card edge connector on the back.
Power Requirements	From Quantum bus; 5 VDC, 550 mA max (350 mA typical).
Serial Ports	Two switch-selectable RS-232/RS-485 ports data I/O ports. 50*, 75‡, 110, 134.5, 150‡, 300, 600, 1200, 1800‡, 2400, 4800, 7200*, 9600, or 19,200‡ baud. NOTE: If one port is set to a baud rate marked (*), the other port can not be set to a baud rate marked (‡). 7 or 8 data bits; odd, even or no parity; 1 or 2 stop bits. RJ-45 female connectors, Modicon Micro pinout.
Serial Port Modes	Each I/O port can independently operate in any of the following modes: Modbus RTU (Host or Gate); Modbus ASCII (Master or Slave); SY/MAX; Net-to-Net; PNIM; RNIM (Master or Slave); PLogic; Chevron; Peripheral; Multidrop; IDEC; Gateway; Transparent; Share; Transfer. Completely user programmable.
Ethernet Port (QUCM-OE only)	10BaseT, RJ-45 connector. Modbus/TCP and/or SY/MAX 802.3 compatible. E-Peer compatible.
Mailbox Registers	2,048 4x register and 32 3x registers. Non-volatile. PLC can map up to 32 input and 32 output registers in local or remote I/O racks and up to 30 in, 32 out in distributed I/O racks.
Setup Registers	3x and 4x registers accessible through any port; stored in non-volatile RAM.
Memory	Two 128K byte FLASH areas for Application storage with Application 2 having a possible 256K bytes; 32K bytes of Non-volatile RAM memory for variables; 8K bytes of Application accessible FLASH; Two 128K bytes of Non-volatile RAM memory as files.
Indicators	LED indicators for Module Active, Ready, Run, Fault, RN1 (application running), RN2 (auto-transfer running); Ethernet Transmit, Receive, Link, Collision; Serial Port Transmit (2), Receive (2). 24 total indicators. 10 user controlled LEDs.
Operating Conditions	0 to 60 degrees C; humidity up to 90% noncondensing; pressure altitude -200 to +10,000 feet MSL.

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